gator, were at once made known; and that on September 23, 1846, the planet Neptune was found by Dr. Galle, of Berlin, on the basis of Leverrier's elements. Adams and Leverrier rank as joint discoverers, and, as such, they received on February 11, 1848, the gold medal of the Royal Astronomical Society. Some members of Adams's college, in order to mark their sense of the importance of his achievement, raised a fund, which the University accepted, for the founding of a prize, to be called "The Adams Prize," to be awarded every two years to the author of the best essay on some subject of pure mathematics, astronomy, or other branch of natural philosophy. In 1851 he was elected President of the Royal Astronomical Society.

As he did not take orders, his Fellowship at St. John's expired in 1852, but he continued to reside in the College until 1853, when he was elected to Pembroke. In 1858 he was appointed Professor of Mathematics at the University of St. Andrews, but he held this office only during a single session. He became the Lowndean Professor of Astronomy and Geometry, at Cambridge, in 1859, in succession to the late Prof. Peacock, and retained this position during the remainder of his life.

Meanwhile, he had been carrying on many important investigations; and, until ill-health disabled him, his labours were never seriously interrupted. Foremost among his later achievements were the results of his researches on the moon and on the theory of the November meteors. In 1866 the Royal Astronomical Society awarded him its gold medal for his lunar researches. He had succeeded Prof. Challis as Director of the Cambridge Observatory in 1861, and in 1884 he served as one of the delegates for Great Britain at the International Meridian Conference at Washington.

For about a year and a half before his death, Prof. Adams was too ill to do as much work as he had been accustomed to do, and during the last ten weeks he was confined to bed. He died on the morning of January 21.

He was a Fellow of the Royal Society, and of the leading foreign scientific bodies; and honorary degrees were conferred upon him by his own University and by Oxford The post of Astronomer-Royal was offered to him by the First Lord of the Admiralty in 1881, on Sir George Airy's retirement, but declined by him on the ground of age.

WALTER HOOD FITCH.

THIS talented botanical artist, whose name appears in almost every illustrated work of importance on botany or horticulture that was published in this country during the half-century from 1835 to 1885, expired at his residence at Kew on the 14th inst., after several years' indisposition, in which mental and physical decay were combined. The deceased was 75 years of age, and his whole life from early youth had been devoted to botanical drawing and painting; and his reputation was so high and so world-wide that it is unnecessary to say much on this point. Nevertheless, some particulars of the work of a man who accomplished so much and so well may be interesting to many persons who only know his work. Of Scotch birth, he was apprenticed, while still very young, to the designing department in a manufactory of fancy cotton goods at Paisley. Here his natural aptitude for drawing developed so rapidly and to such a degree as to indicate that he possessed talents of no ordinary kind, and his name soon became known outside of the factory. By some means he came under the notice of a friend of the late Sir William Hooker, and he, knowing that the latter was in need of a draughtsman, strongly recommended him to try the youth's capabilities. Sir William Hooker, at that time Regius Professor of Botany at Glasgow, acted on this suggestion, and the result was so satisfactory that he negotiated the cancel of Fitch's indentures, took him into his sole employ, and trained him for the kind of work he wished him to execute. We have not ascertained the exact date of this event, but it must have been as early as the year 1832, for already in 1834 he was a contributor to the *Botanical Magazine*, and he continued his connection with this long-lived periodical down to 1878, having during this period drawn and lithographed some 3000 of the plates. At first his initials did not appear regularly on the plates, but, on reference to the volume for 1837, it may be seen that it was practically all his, and that he had already become an efficient botanical draughtsman. The same year (1837) the first volume of Hooker's "Icones Plantarum" was published, and although Fitch's name does not appear, we have other evidence that he was the artist. In short, he not only illustrated all the numerous works of his first patron, but also those of his son, now Sir Joseph Hooker, as well as those of numerous other public and private persons. The fertility of his pencil was equalled by its facility, grace, vigour, and boldness; and his colouring was usually rich, and full, and truthful. It is true that most of his work does not exhibit the finish and minute detail characteristic of the masterpieces of the productions of the few other botanical artists with which comparisons could be made. In 1841, Sir William Hooker was appointed Director of the Royal Gardens, Kew, Fitch accompanying him, and residing there until his death. At Kew he found full scope for his powers, and notable amongst the numerous productions of his best days are the magnificent elephant folio plates representing various stages of the development of the *Victoria regia* as cultivated at Kew and Syon House; the plates of Sir William Hooker's numerous works on ferns; of Sir Joseph Hooker's "Botany of Sir James Ross's Antarctic Voyage"; and his "Illustrations of Himalayan Plants and Himalayan Rhododendrons"; of Howard's "Quinologia": of Bateman's "Odontoglossum"; of Welwitch's "West African Plants"; of Speke and Grant's "Plants of the Upper Nile"; and of Seemann's "Botany of the Voyage of the *Herald*." Examples of his later work are to be found in Elwes's "Lilies," and the botany of Salvin and Godman's "Biologia Centrali-Americana," the latter the last important work he accomplished. As might be imagined from the amount of work he did, Fitch wielded the pencil with remarkable rapidity and freedom; and one could not but admire the way in which he stood up and, free handed, guided his pencil over the stone without any preliminary drawing. Botanical drawing, however, is not a very lucrative profession, and therefore not likely to attract persons of great attainments; but when Fitch became incapacitated through failing health, his merits were so far recognized as to gain him a Civil List pension, on the recommendation of the Earl of Beaconsfield, of £100 a year.

NOTES.

MARCH 17 is the date fixed for the Bakerian Lecture of the Royal Society, and Prof. James Thomson is to be invited to deliver it. The Croonian Lecture is to be delivered on March 24 by Prof. Angelo Mosso, of Turin, the subject being "The Temperature of the Brain."

AT the Council Meeting of the Royal Society on the 21st inst., no fewer than ten deaths were announced, seven of the deceased having been Fellows of the Royal Society, and three Foreign Members. Taking into account that the average number of deaths for the whole year is fifteen, such a list for a single month is quite extraordinary.

PHYSIOLOGICAL science has sustained a severe loss by the death of Dr. Ernst von Brücke, the well-known Professor of Physiology at the University of Vienna. He died at Vienna on January 8, in his seventy-third year. He was a pupil of Johannes Müller, and made many contributions of first-rate importance to the study of physiology.

WE regret to have to record the death of Mr. Thomas Roberts, F.G.S., of St. John's College, assistant to the Woodwardian Professor of Geology at Cambridge. He died on Saturday last at the age of thirty-five. Mr. Roberts obtained a first class in the Natural Sciences Tripos, Part I., in June 1882, and in the second part of the same Tripos for geology in June 1883. He also won the Sedgwick Prize for a geological essay in 1886. Prof. Hughes, in his annual reports to the Senate, often alluded to the value of the services rendered by Mr. Roberts to the students of his classes.

THE Sydney papers announce the death of Sir William Macleay, who did much to promote an interest in science in New South Wales. It was mainly through his efforts that the Linnean Society of New South Wales was founded; and on many occasions he acted towards it with splendid liberality. The building in which it meets was erected at Sir William's expense. This building he transferred to the Society with the lease of the land on which it stands, giving at the same time, by way of endowment, a mortgage of £14,000 bearing interest at the rate of 5 per cent. per annum. He provided an excellent reference library, and equipped the rooms with fittings, furniture, and apparatus for scientific research. According to a speech delivered by one of the presidents, and quoted by the *Sydney Morning Herald*, he also bore the greater part of the expenses of the Society's publications, supplied the salaries of its officers, and "furnished its specialists with abundant funds for their investigations and their maintenance." Besides, he was the chief instrument in obtaining the Society's Charter, and he arranged to bequeath the sum of £35,000 for the establishment of four "Linnean Fellowships" of the annual value of £400 each. In 1874, Sir William Macleay bought and fitted out the barque *Chevert* for a scientific expedition to New Guinea; and he was thus enabled to get together a very valuable collection of natural history specimens, which now form an important part of what is known as the Macleay Museum of Natural History, presented by him to the University of Sydney. In addition to his collection, which was estimated at £23,000, he gave to the University £6000 to provide for the salary of a curator.

THE facts relating to the electrical transmission of power from Lauffen, on the Neckar, to Frankfort, a distance of about 110 English miles, have now been made known. They have been established by means of elaborate tests applied by a jury of experts under Prof. Weber, of Zürich. When 113 horse-power was taken from the river, the amount received at Frankfort through the wires was about 81 horse-power, showing an efficiency, in spite of all possible sources of loss, of 72$\frac{1}{6}$ per cent. Prof. Silvanus Thompson, who has called attention to these striking facts, points out that it is now only a question of means whether, at the Chicago Exposition, there will be a transmission through wires of 1000 horse-power taken from the Falls of Niagara.

AN Electrical Exhibition was opened at St. Petersburg on January 23 by M. Vishnegradski, Minister of Finance, who was accompanied on the occasion by M. Durnovo, Minister of the Interior, and a number of distinguished persons. The Finance Minister, in addressing those present, traced the progress that had been made in electro-technical knowledge during the last twenty years, and dwelt upon the value of the present Exhibition for students of electricity. The Ministers and the other personages then proceeded to visit the different sections. The Exhibition is said to be of a varied and interesting character, displaying many different kinds of machines at work.

ACCORDING to the American journal *Electricity*, the plans and specifications for the construction of the conduit system and subways in which the electric conductors, at the Chicago Exposition, are to be carried through the grounds to the different buildings have been issued by the construction department of the World's Fair. The specifications call for the completion of the work by April 15, 1892. The total length of the subway is about 4500 feet. The larger portion of the conduit will be 8 feet and 4 inches square, and will be built of the best seasoned pine. The conduit is to have two linings, the outer one consisting of 2 inch tarred plank. Between the linings will be a concrete mixture of cement, plaster, and sand.

THE *Kew Bulletin* for January opens with some most interesting notes, by Mr. J. G. Baker, F.R.S., on Agaves and Arborescent Liliaceæ on the Riviera. Mr. Baker went in November last to the Riviera, chiefly for the purpose of studying these two groups of plants, which grow there in quantities in the open air. The number also contains accounts of the Cape Town Botanic Garden and the Gold Coast Botanical Station.

THE first appendix of the *Kew Bulletin* of the present year consists of a list of such hardy herbaceous annual and perennial plants, as well as of such trees and shrubs as matured seeds under cultivation in the Royal Gardens, Kew, during the year 1891. These seeds are available for exchange with colonial, Indian, and foreign Botanic Gardens, as well as with regular correspondents of Kew. The seeds can be obtained only in moderate quantity, and are not sold to the general public. No application, except from remote colonial possessions, can be received for seeds after the end of March.

THE Woolhope Club has voted £10 towards defraying the expenses connected with the course of Oxford University Extension lectures, now being delivered in Hereford by Mr. C. Carus-Wilson, on the "Outlines of Geology." It is satisfactory to note this instance of a local Club making use of the facilities offered by University Extension for giving to its younger members the opportunity of obtaining systematic training in geological knowledge. The liberal-minded action of the Woolhope Club might well be followed by other Societies throughout the country if they are satisfied of the lecturer's capacity.

WITH reference to Prof. Ray Lankester's communication on "Science in Japan" (p. 256), and especially to his remark that "English, indeed, appears to be the official language of the Imperial University, Tokyo," the following extract may be found interesting. It is taken from the preface to an English translation of a Japanese text-book of elementary geometry, based on that of the Association for the Improvement of Geometrical Teaching, and compiled by Prof. Kikuchi, of the Imperial University, for use in the ordinary normal and middle schools. "In some schools, text-books in English are in use in all the classes, in others only in the higher classes. My object in making this translation is to supply a text-book in English for use in such schools uniform with the Japanese text-book, so that the scholars may pass from one to the other without any trouble."

JUDGING by the contents of a short paper read recently before the Linnean Society, and the discussion which followed, there is an interesting field for scientific investigation amongst the ticks (*Ixodidæ*) which are to be found in some parts of Jamaica and other portions of tropical America. These undesirable Acarina appear to have been introduced to Jamaica with cattle from the mainland. They are most prevalent, therefore, in districts where cattle-rearing is the principal industry. Their maximum appearance depends very much on the season and other circumstances not yet fully worked out. In tropical countries nearly everywhere there are forms locally called ticks, but evidently allied to the harvest-bugs of Europe. These are called by the French *Rouget*, and in the West Indies *Bête rouge*. They are supposed to be larval forms of Trombidum, and are not ticks in the usual acceptance of the term. One remarkable power possessed by the *Ixodidæ* is that of existing for a great length of time without food. Specimens have been known to live for years accidentally shut up in a small box. Sir Joseph Hooker, in the "Himalayan Journals," recently reprinted, states (p. 196), "that ticks were present everywhere in the hill forests"; and he remarks: "What ticks feed upon in these humid forests is a perfect mystery to me, for from 6000 to 9000 feet they literally swarmed where there was neither path nor animal life." In attacking man and animals ticks insert the proboscis deeply without pain. Buried head and shoulders, and retained by a barbed lancet, they are only to be extracted by force, which is very painful. At present very little is known of the *Ixodidæ* of tropical America. It is possible there may exist numerous species, each with its own special life-history. No one appears as yet to have given undivided attention to the group, and possibly less is known of ticks from a scientific point than any other members of the West Indian fauna. In view of the influence of their occurrence on man and animals this is somewhat anomalous.

M. JEAN DYBOWSKI contributes to the current number of *La Nature* a sketch of a journey he has made from Loango to Brazzaville, and from thence to Bangui. He has collected many objects of scientific interest, including 480 ethnographic specimens, 550 botanic specimens, 280 birds, 100 mammifers, reptiles, fishes, insects, &c.

SEVERAL shocks of earthquake were felt at Rome on the evening of January 22. According to a telegram sent through Reuter's Agency, they caused such a panic in the more crowded quarters that many of the inhabitants fled from their houses, and, notwithstanding the cold weather, spent the night in the streets and public squares. The shocks were felt in the theatres, but the panic there was of short duration. The seismic disturbance had a distinct effect upon the clocks, some stopping at 11.25, and others at 11.27. Several of the lamps in the streets were extinguished. The shocks were noticed by the Pope, who sent to the Vatican Observatory to make inquiries. They were very generally felt throughout the province of Rome. At Genzano a few houses fell in, but no one was injured. At Civita Lavinia an old tower, dating from the Middle Ages, fell and buried two persons, who were, however, promptly extricated. Several houses are in a dangerous state. A severe shock was also experienced at Velletri, but the damage done was insignificant.

ACCORDING to the Paris correspondent of the *Daily News*, two slight earthquake shocks were felt on Sunday, January 24, at Le Mans, the centre of an important agricultural district in the west of France. At Sarce, about 2 a.m., the villagers were awakened by a rather severe shock which caused the school bell to ring. At Château du Loir, a town on the State railway line from Paris to Bordeaux, the first shock lasted three seconds, and awakened everybody. The second took place at half-past three, and was slight.

THE U.S. *Monthly Weather Review* for October 1891, contains a continuation of curves previously published, showing the fluctuations of temperature and pressure at the base and summit of Mount Washington (altitude 6279 feet), and completes them for the months January to March from 1871-86, or for 16 years, with a short discussion by Prof. H. A. Hazen. The base curves show many minor fluctuations of temperature not to be found in the summit curves, most of which are probably due to diurnal range, but as regards the larger fluctuations the most marked characteristic in the temperature curves has been their closeness at base and summit. The earlier change at the summit in both cold and hot waves is remarkable. The fluctuations of pressure are almost identical at the base and summit. Occasionally, the change in temperature at the summit has preceded that in pressure to such an extent as to cause the phases of the latter to lag behind. The curves have been published in the hope that meteorologists will make a special study of them.

IT is a well-known fact that, with the same temperature by the thermometer, one may have, at different times, a very different feeling of heat or cold. This varies with the temperature of the skin, which is chiefly influenced (according to M. Vincent, of Uccle Observatory, Belgium), by four things: air-temperature, air-moisture, solar radiation, and force of wind. M. Vincent recently made a large number of observations of skin-temperature in the ball of the left hand, and constructed a formula by means of which the skin-temperature may be approximately deduced from those four elements. He experimented by keeping three of the four constant, while the fourth was varied, and a relation could thus be determined between the latter and skin-temperature. One fact which soon appeared was, that the relative moisture of the air has but little influence on skin-temperature. It was also found that for every 1° C. of the actinometric difference (excess of black bulb thermometer) the skin-temperature rises about 0°·2; and with small wind-velocities, every metre per second depresses the skin-temperature about 1°·2. In testing his formula, M. Vincent found, with cold or very cold sensation, considerably greater differences between the calculated and observed values than in other cases. This he attributes to the great cooling of the relatively small mass of the hand. Taking the cheek or eyelid, the results were better. He constructs a scale of sensations corresponding to different skin-temperatures as he found them (which scale would, of course, vary somewhat with individuals).

LAST winter, in December and January, M. Chaix made a number of observations of the temperature of the air, the snow, and the ground, at Geneva; of which he has given an account to the Physical Society there. He observed the air at four different heights; granular, pulverulent, and bedded snow, on the surface and at different depths; and the surface of bare ground as well as of ground covered with snow. There was no difference in mean temperature between the air at 1 and at 2 metres; and very little between the former and that on the snow surface. The surface of the ground was 4°·265 C. warmer than the surface of the snow (0·13 m. above), through arrest of radiation. But the bare ground was not cooled so much as the snow surface, and it was only 2°·04 colder than the snow-clad ground. This shows the frigorific influence of snow on climate. Air passing over bare ground would have been 2° warmer than if it passed over the snow. The snow surface was sometimes warmer, sometimes colder, than the air 1 or 2 m. above. In the dry winters of Siberia and Sweden, the snow-surface is generally (according to Woeikof) much colder than the air. M. Chaix explains the variations observed at Geneva by fluctuations in the relative humidity, involving alternate vaporization and condensation at the snow surface. In two-thirds of the cases, indeed, abnormal cooling of the snow corresponded with a low humidity, and heating with a high humidity, and often formation of hoar-frost at the surface.

AN interesting paper on Prof. Wiborgh's air-pyrometers was read by Mr. John Crum before the Institution of Engineers and Shipbuilders in Scotland on December 22 last, and is now printed in the Institution's Transactions. Beginning at the beginning, Mr. Crum explained that a pyrometer is an instrument used in the measurement of high temperatures. In constructing his pyrometers, Prof. Wiborgh followed two principles—first, that a certain quantity of air, when heated, is maintained at the same volume, and the increase of pressure gives a measure of the increased temperature; and second, that the air is maintained unaltered in pressure when the temperature is determined by the change of volume. The two forms of his air-pyrometers may be compared to the two forms of the barometer—the mercurial and the aneroid. The air-pyrometer in its aneroid or metallic form is especially adapted to determine the temperature of the hot blast, the gases from all sorts of furnaces, of distillation-products from retorts, &c.; and generally it will fulfil any demands that may fairly be made upon an accurate instrument for ascertaining temperatures for practical purposes, in cases where the temperature to be determined ranges from 0° to 1400° C.

A REMARKABLE illustration of the height of breaking waves is afforded by the following paragraph, which we take from the *San Francisco Chronicle* of January 6:—"*Portland, January* 5. The lighthouse tender *Manzanita* reached Tillamook Rock Sunday for the first time in six weeks, and brought away the keeper, George Hunt, who has been on the rock for four years, and has been transferred to the Cape Mars Light. He says, in the storm of December 7 the waves swept clear over the house, washing away their boats, and tearing loose and carrying away the landing platform and tramway, which were bolted to the rock. On the 29th the waves were still higher, and streams of water poured into the lantern through the ventilators in the balloon top of the dome, 157 feet above the sea-level. The lighthouse was shaken to its foundation by the impact of seas against it, and the water found its way into the house. Men were on duty all night to keep the lamp burning, and but for the wire screen the shutters of the lantern would have been demolished. All hands were alarmed, and old sailors of the crew say they would sooner have taken their chances on board a ship." Prof. Edward S. Holden informs us that it is known to him personally that this lighthouse is sometimes buried in spray and water, and that the glass of its lanterns has been broken by the impact.

THE U.S. National Museum prints a capital paper, by Mr. Frederic A. Lucas, on animals recently extinct or threatened with extermination, as represented in the Museum's collections. In each case the cause of destruction is noted. Mr. Lucas finds that in nearly every instance the cause is "reckless slaughter by man." As an instance of the way in which animals may be destroyed, he refers in the introduction to peccaries. In 1885 these little animals were so abundant in several counties of Texas that their well-worn tails were everywhere to be seen, while their favourite haunts could be readily picked out by the peculiar musky odour characteristic of the creatures. Shortly after that date, hog-skin goods being in favour, a price of fifty cents each was offered for peccary hides, with the result that by 1890 the peccaries were practically exterminated.

THE fresh-water sponges in the collection of the late Mr. Henry Mills were placed some time ago in the hands of Dr. D. S. Kellicott, on the understanding that a representative set of specimens would be selected and prepared for the Buffalo Society of Natural Sciences. Dr. Kellicott has now finished his labours, and submitted the specimens to the Society. He is of opinion that the region about Buffalo Bay and the Niagara River affords almost ideal conditions for the life and growth of fresh-water animals. Its richness, he thinks, is even yet scarcely appreciated. The outlet of the American fresh-water ocean remains at almost a constant level. It is not, like so many lesser American rivers, a mere thread of heated water in summer and a flood of tilt in winter and spring. Neither storm nor season greatly disturbs its clearness or destroys its purity; and owing to its mass its temperature changes slowly and the range is moderate. There are also deep passages, once portions of the river-bed, now almost land-locked, but still sufficiently open to the river to admit fresh water and maintain a constant level. Aquatic life in these channels is remarkably luxuriant for a Nerth American station in latitude 43°. Again, there are small rivers or creeks entering the main river, the estuaries of which are deep, quiet, and supplied from above with swamp and land drainage, whilst their constancy is assured by that of the Niagara. These are teeming with a vast variety of microscopic plants and animals from early summer to December. These conditions are especially favourable to the growth of sponges, and they are found in extraordinary abundance. Whilst the number of species recorded compares favourably with any explored locality in the world, the abundance of representatives is, according to Dr. Kellicott's experience and the testimony of others, quite unsurpassed.

THE working of mercury mines appears to have become an industry of some importance in Russia. According to the *Journal de St. Pétersbourg*, quoted by the *Board of Trade Journal*, there have been found in the district of Bakhmont (province of Catherinoslaw) rich deposits of mercury ore, and the works which have been established there, increasing their operations year by year, have succeeded in producing at the present time 20,000 pouds of mercury annually (poud = 36 pounds avoirdupois). Other deposits of mercury have been discovered in Caucasia, in the province of Daghestan; and the Mining Administration has every reason to believe that private enterprises will be established which will make undertakings of this kind very profitable. Mercury is, as is known, very rare. It is only found in more or less considerable quantity in Spain, Austria, the United States of America, and Italy. The works in the province of Catherinoslaw extract 20,000 pouds of pure mercury from more than 3,500,000 pouds of ore (sulphate of mercury). This quantity is sufficient for Russian consumption, and even allows of an export of 14,000 pouds to other countries.

SOME time ago the Minister of Agriculture in Victoria, acting on the advice of the Board of Viticulture, authorized, among other reserves throughout the colony, the reservation of about 1100 acres in the Dunolly district as a viticultural reserve for experimental purposes. From this area a space of twenty acres has been excised, which has now been cleared and fenced with vermin-proof wire, for the purpose of establishing a perfume farm and experimental plot, for the growing of perfume plants, medicinal drugs, and the production of essential oils. A list of the plants under cultivation at the farm, with a report of the progress up to date, is included in a hand-book issued by the Victorian Royal Commission on Vegetable Products; and it is anticipated that satisfactory results will follow during the present season. The hand-book is published in order that all who may choose to avail themselves of the opportunity may make experiment in their several localities, with the view of comparison with the plot established at Dunolly for educational purposes, and so that an interesting and profitable industry may be established in the colony.

FROM a series of experiments made a short time ago (*Naturw. Rdsch.*), Prof. Wesendonck, of Berlin, inferred that dustless air, in friction with metals, does not generate electricity. But carbonic acid, under like conditions, readily gave a charge, and this was thought to be due to cloud-formation in the gas streaming out of the vessel which had held it in liquid form, the small water-particles charging the metal by friction. Further experiment has seemed to confirm this view. The gas let out from such a vessel, in vertical position, with some freedom, appears cloudy. Gaseous carbonic acid, under 50 or 60 atmospheres, at ordinary room temperature, must be allowed to issue in a stronger current from the containing bomb to obtain this cloudy look. If a brass spiral is attached to the mouth of the bomb, the cloud-formation is made very difficult; and if the spiral is then strongly cooled, the cloud reappears. With the spiral in boiling water, no cloud is formed, however free the stream of gas. This behaviour quite corresponded to the electrical effects. Even a weak stream of gas from the vessel of liquid carbonic acid gave a well-marked charge; a less effect was had with the bomb of compressed gas; still less when the spiral was added; and least of all with the spiral in hot water, however violent the stream of gas. Prof. Wesendonck concludes that gaseous carbonic acid is not capable of generating electricity by mechanical friction on metal.

HERR ÅNGSTRÖM has been lately engaged in examining with a bolometer the heat radiation of various rarefied gases under the electric discharge. He confined himself to the stronger positive light, using cylindrical glass tubes, with lateral electrodes, and rock salt plates at the ends. An accumulator of 800 Planté elements was the source of electricity. Briefly stated, the results are these:—With a given pressure the radiation is proportional to the intensity of the current. With constant current, the radiation does not vary while the pressure varies between 0·1 and 1·5 mm., but at higher pressures it increases somewhat. With the same gas and pressure, the composition of the radiation is constant, and does not depend on the intensity of the current. With varying density of gas, the ratio of the intensity of radiation of shorter wave-lengths to that of the whole decreases with increase of pressure. (This ratio varied, *e.g.*, from 46 to 15 per cent. in carbonic oxide between the above pressure limits.) Thus this ratio, at low pressures, reaches much higher values than in our ordinary light sources. The intensity of total radiation varies considerably in different gases, and stands in no simple relation to the molecular weight, nor to difference of potential in the gas; nor does it seem to depend on absorption of gas at ordinary pressure and temperature.

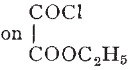
DR. SYMES THOMPSON will deliver Gresham Lectures, on the nerves, on February 2, 3, 4, and 5. They will begin each evening at six o'clock, and will be free to the public.

PROF. H. G. SEELEY, F.R.S., will deliver a course of four lectures at Gresham College, in connection with the London Geological Field Class on the four Saturday afternoons in February. The subject will be: "The Physical Geography of the London District in relation to its Geological Structure." Particulars may be had of the Hon. Sec., Mr. J. Herbert Hodd, 78 Queen's Road, Finsbury Park.

THE third series of lectures given by the Sunday Lecture Society begins on Sunday afternoon, January 31, in St. George's Hall, Langham Place, at 4 p.m., when a lecture will be delivered by Mr. Sergius Stepniak. Lectures will subsequently be given by Dr. Andrew Wilson, Mr. George Wotherspoon, Mrs. Proctor (widow of the late Richard A. Proctor), Mr. Frank Kerslake, Miss Amelia B. Edwards, and Dr. E. E. Klein, F.R.S.

THE following gentlemen have arranged to give lectures at the Royal Victoria Hall during February: on the 2nd, Dr. James Edmunds on "An Emigrant in North-West Canada"; 9th, Prof. Oliver on "The Habits of Plants"; 16th, Prof. Carlton Lambert on "Gas, Paraffine, and Electricity" (with experiments); 23rd, Mr. J. W. Gregory on "Waterfalls."

AT the last meeting of the Chemical Society, on January 21, Prof. Smithells gave a preliminary account of some novel experiments on "The Origin of Flame Coloration." At a previous meeting he described a method of widely separating the two cones of combustion which constitute the flame of a bunsen burner (see NATURE, vol. xlv. p. 214). Trying the effect of introducing metallic salts into the two cones separately, he has found that in most cases no marked differences of coloration are produced. But in the case of copper salts the inner cone assumes merely a general yellowish luminosity, whilst the outer cone is brilliantly tinged with the green colour commonly ascribed to the vapour of copper or copper salts. Of the two cones the inner one is by far the hotter. The chief difference between them, apart from this, is that the inner one is surrounded by an atmosphere containing carbon dioxide, carbon monoxide, water, and hydrogen, but no uncombined oxygen, whereas the outer one is bounded by atmospheric air. The only explanation of the phenomenon that has yet offered itself is that the production of the green colour is connected with the act of oxidation. Further support is lent to this view by the fact that if copper oxide dust be introduced into the inner cone, a general luminosity devoid of green is produced, but at the same time the outer cone is coloured green. It would appear as if the copper oxide were reduced to metal in the inner cone, and simply glowed as a solid body, the copper being thereupon reoxidized in the upper flames in contact with the air. The hypothesis is therefore tentatively put forward that some flame colorations at any rate are due to ether disturbances accompanying the act of chemical combination, and are not to be ascribed to the mere incandescence of single substances. Further experiments made with the apparatus are conformable to this view, but Prof. Smithells has commenced a spectroscopic study of the subject, and has in view the prosecution of independent methods of inquiry. Understanding that the flame-dividing apparatus is likely to come into general use, he has been led to give this preliminary account of the experiments.

A NEW liquid compound of carbon, oxygen, and chlorine was described by M. Troost on behalf of M. Fauconnier at the last meeting of the Académie des Sciences. It may be considered as oxalyl chloride, $\begin{matrix}\mathrm{COCl}\\ |\\ \mathrm{COCl}\end{matrix}$, the dichlorine derivative of oxalic acid, and has been prepared by M. Fauconnier by the action of phosphorus pentachloride upon ethyl oxalate. Prof. von Richter has previously shown that when these two substances are allowed to react upon each other, a compound of the composition  $\begin{matrix}\mathrm{COCl}\\ |\\ \mathrm{COOC_2H_5}\end{matrix}$ is formed. This substance, which has been termed chloroxalic ether, is a fuming liquid possessing a pungent odour, and boiling at 131°·5. The new compound is produced by varying the conditions of Prof. Richter's experiment in the following manner. A mixture of phosphorus pentachloride and ethyl oxalate, in the proportion of two molecules of the former to one of the latter, is heated by means of an oil-bath in a flask fitted with a Le Bel-Henninger fractional distillation apparatus and condenser. When the temperature of the bath reaches 125°, a lively reaction commences, accompanied by evolution of ethyl chloride vapour and hydrochloric acid. When the temperature is slowly raised to 150°–155°, a liquid mixture distils over, consisting of oxalyl dichloride, phosphorus oxychloride, and ethyl chloride. When this mixture is subjected to repeated fractional distillation, the oxalyl dichloride is eventually isolated as a mobile, strongly-fuming liquid boiling at 70°. It is endowed with an odour more irritating even than those of the chlorides and oxychloride of phosphorus, and which reminds one somewhat of carbonyl chloride, $COCl_2$. It reacts violently with water, forming oxalic and hydrochloric acids. With anhydrous alcohols it reacts in an extremely energetic manner. Thus with methyl alcohol it forms methyl oxalate, which may be obtained crystallized from the solution, and hydrochloric acid is evolved, great rise of temperature being manifested during the reaction. The formation of this second oxychloride of carbon is of considerable interest, as emphasizing once more the disappearance of the line of demarcation between organic and inorganic compounds; for here we derive what may truly be considered as an inorganic compound from a substance so purely organic as an ethereal salt.

IN our chemical note of last week the experiments of Dr. Merz upon magnesium nitride, Mg_3N_2, were described. It will be remembered that magnesium was shown to combine with nitrogen in a most vigorous manner when heated to redness in a stream of the gas. M. Ouvrard, in the current number of the *Comptes rendus*, shows that lithium too combines energetically with nitrogen. A quantity of this metal was placed in a small boat constructed of iron, the only convenient substance which will withstand the action of fused lithium, and the boat was placed in a combustion tube through which a stream of nitrogen was driven. Upon gradually raising the temperature of the tube and contents, a point was attained, in the neighbourhood of low-redness, when combination suddenly occurred, the metal becoming brilliantly incandescent and increasing rapidly in volume, while the nitrogen in the apparatus was almost entirely absorbed. On continuing the stream of nitrogen until the apparatus became quite cold, the lithium nitride was found in the form of a black spongy mass. Its composition was proved by analysis to be Li_3N, analogous to magnesium nitride, Mg_3N_2, and to ammonia, H_3N. Indeed, it may readily be converted into the latter gas by heating it in a stream of hydrogen. It behaves with water very similarly to magnesium nitride, at once decomposing that liquid with liberation of large quantities of ammonia and formation of a solution of lithia.

THE additions to the Zoological Society's Gardens during the past week include two Macaque Monkeys (*Macacus cynomolgus* ♂ ♀) from India, presented respectively by Mr. B. H. Heald and Mrs. E. Day; a Rhesus Monkey (*Macacus rhesus*) from India, presented by Mr. Alfred J. Hayward; two Common Squirrels (*Sciurus vulgaris*), British, presented by Master Fred Corfield; two Ring-necked Parrakeets (*Palæornis torquatus*) from India, presented by Miss Heinekey; six Mantell's Apteryx (*Apteryx mantelli*) from New Zealand, deposited.

OUR ASTRONOMICAL COLUMN.

WOLF'S NUMBERS FOR 1891.—*Comptes rendus* for January 18 contains a communication by M. Rodolf Wolf on the state of solar activity in 1891. The following table shows the results of solar observations made at Zurich Observatory, and magnetic observations made at Milan. The relative numbers (*r*) have been obtained by the method used in previous years.

1891.	*r*.	Increments on the relative numbers in 1890.	Variations of magnetic declination.	Increments on the variations of declination in 1890.
January	17·1	11·0	3′·71	0′·69
February	23·0	22·1	4·51	−0·30
March	10·0	4·7	7·85	0·36
April	19·4	17·9	10·58	1·90
May	43·2	38·6	10·70	3·00
June	48·7	47·3	10·36	1·52
July	59·1	47·7	10·98	2·41
August	32·6	24·9	9·96	1·96
September	52·1	35·4	8·55	1·45
October	50·4	39·3	8·49	−0·23
November	41·0	33·8	4·73	1·63
December	30·6	23·4	8·85	0·31
Means	35·6	28·8	7·77	1·22

The relative numbers and the magnetic variations show a decided increase on the values obtained for 1890, and the parallelism between the two series continues as in former years. A discussion of these and previous results indicates that the last minimum of solar activity has the date 1889·6.

A NEW JOURNAL.—The *Sidereal Messenger* has ceased to exist under this title, and has merged into *Astronomy and Astro-Physics*. The first copy of this new journal has recently been published in America. Its production is the natural result of the development of astronomical physics. One portion of the journal is to be devoted to general astronomy, whilst the other deals with astro-physics. The editor of the former is Mr. W. W. Payne, who so ably conducted the *Sidereal Messenger*, and the latter section is under the charge of Prof. G. E. Hale, whose excellent works on solar prominence photography are known to all spectroscopists. If the editors can fill future numbers of the journal with so many interesting and important articles and notes as make up the first number, they will attain a well-deserved success. Many of the articles have been published in other journals, but this, of course, does not in the least detract from the value of the new journal. The literature of spectroscopy is truly said to be widely scattered, and Prof. Hale is doing a meritorious work in bringing it all together.

KOREA.

AT the meeting of the Royal Geographical Society on Monday night, the paper read was on a journey through North Korea to the Ch'ang-pai Shan, by Mr. Charles W. Campbell. Ch'ang-pai Shan, or "Ever White Mountain," is the same as Peik-tu San, or White Head Mountain, and "The Long White Mountain," so graphically described by Mr. James in his book of that title. It lies in Manchuria, just beyond the Korean boundary, and is remarkable for the deep-blue lake which lies in a deep hollow on the ridge joining two of its peaks. It was not till August 1889 that Mr. Campbell succeeded in leaving Seoul, the capital of Korea. He journeyed east and north along the coast. The country traversed is typical of the centre and north of the country.

"Korea," Mr. Campbell said, "is a land of mountains. Go where you will, a stretch of level road is rare, and a stretch of level plain rarer still. The view from any prominent height is always the same; the eye ranges over an expanse of hill-tops, now running in a succession of long billowy lines, now broken up like the wavelets in a choppy sea, often green with forest, but just as often bare, brown, and forbidding. Clear mountain brooks or shallow streams rushing over beds of gravel are never wanting in the valleys below, where a rude log bridge, or curling smoke, or the presence of cultivation, leads you to observe the brown thatch of some huts clustered under the lea of a hill. These hamlets are of two distinct kinds—the purely agricultural, and those which depend as much on the entertainment of travellers as on farming. The site of the agricultural village is a hill-slope facing the south. Over this, low, mud-walled, straw-thatched hovels, each standing in its own patch of garden, which is protected by a neat fence of interlaced stems, are scattered at random, and there is not much attempt at a street anywhere. Every house has its threshing-floor of beaten clay, the workshop of the family. The stream which runs past the foot of the hill, or courses down a gully in its side, is lined with women and girls washing clothes with sticks instead of soap, preparing cabbages for pickle, or steeping hemp. Seen from a distance, these places are quite picturesque. The uneven terraces of thatch are brightened by the foliage and flowers of gourds and melons which climb all over the huts. In the gardens surrounding each house are plots of red chilli, rows of castor-oil plants, and fruit trees, such as peach, apricot, pear, and persimmon.

"The roadside village, on the other hand, is generally a most unlovely spot. The only street is the main highway, which is lined on both sides by a straggling collection of the huts I have mentioned. Heaps of refuse, open drains, malodorous pools, stacks of brushwood for fuel, nude sun-tanned children disporting themselves, men and women threshing grain, and occasionally a crowd of disputants, all combine to make it a very indifferent thoroughfare. Most of the houses are inns or eating-shops. The main gate of the inn leads directly from the street into a quadrangle bounded on two sides by open sheds, which are provided with troughs for the feeding of pack animals, and on the other two sides by the guest rooms and kitchen. The courtyard is untidy, often dominated by a powerful pig-stye, and littered with fodder or earthenware pitchers and vats, whose contents are usually the strong-smelling pickled cabbages and turnips so dear to Korean stomachs.

"The main industry, of course, is agriculture, carried on under